A CONTRIBUTION TO THE DESMID FLORA OF NEW HAMPSHIRE.

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(Plate 61.)

ALTHOUGH New Hampshire contains the greater part of what may be called the mountain region of New England, with the highest elevations of land and great numbers of ponds and lakes, its Desmid flora has hardly been touched on. By the natural conditions of alpine summits and valley lakes a considerable number of species would naturally be expected. In the present paper it is believed that all previous records are included. These records are as follows: a few species collected by Lewis at Saco Lake and reported in Wood's Fresh Water Algae of the United States; a short list of about a dozen species from Hanover recorded by Edwards in the Geology of New Hampshire; a very few records in Wolle's Desmids of the United States; a few records from about Rochester by Hastings; a few records by L. N. Johnson; a number of records and descriptions of new species by W. & G. S. West, these being largely from the notes of L. N. Johnson.

During the last three years the writer has obtained a considerable amount of New Hampshire material. This consists of the following: very rich collections from Pudding Pond, North Conway and from Intervale, consisting of Utricularia and an abundance of Desmids, collected by Dr. Glover M. Allen; collections from North Woodstock and Mt. Moosilauke (3000 and 4000 ft. altitude) collected by Warren A. Priest; several lots of material from about North Woodstock, collected by George A. Fisher; material from Squam Lake, collected by Herman Gammons; and lastly material from Noone's Station, obtained from dried Utricularia specimens in the Gray Herbarium collected by Dr. B. L. Robinson (no. 473).

The material of L. N. Johnson, which was reported by slide numbers and which is now in the Cryptogamic Herbarium of Harvard University, has been examined by the writer through the kindness of Drs. Farlow and Thaxter. Those which were located are marked with an exclamation point (!) as well as all the other records for which specimens were seen by the writer.

As the material from North Conway and Intervale was taken from ponds, which are in direct water connection with that from which Wood's specimens were obtained, it is not surprising to find nearly if not all of his recorded species appearing from these two localities.

Nearly all of Prof. Bailey's species have also turned up in this material. As access has been had to his original notes and drawings, certain critical notes are appended to those species, as the published figures were as a rule poor, while the originals were careful camera drawings.

Certain of the names and genera used by Wolle in his Desmids of the United States need revision and for the species touched upon this has been roughly indicated. In the arrangement of the genera the writer has followed that given in W. & G. S. West's British Desmidiaceæ with slight differences, these last conforming more closely with Wille's classification in Engler and Prantl. My thanks are due to Dr. O. Borge of Stockholm, Sweden, for helpful suggestions especially as to certain of the forms here published as new. Species new to the New England list are preceded by an asterisk.

The abbreviations H. J. and H. C. indicate that the specimens are preserved in the herbarium of L. N. Johnson and of the writer respectively.

Gonatozygon DeBary.

G. monotaenium DeBary. (*G. asperum*, Wolle '92: *G. Ralfsii* DeBary.) Length 260 μ: breadth 11 μ. Pudding Pond, North Conway, rare! Holderness, scarce (*Wests*).

G. Brebissonii DeBary. (*G. Ralfsii*, Johnson '95). Length 136–160 μ: breadth 6–8 μ. Laconia (*Wests*).

G. aculeatum Hastings. Breadth with spines 40 μ, without spines 20 μ. Pennichuck Pond, Nashua (*Hastings*). Laconia, frequent (*Wests*). Meredith, occasional (*Johnson*).

Spirotaenia Bréb.

S. condensata Bréb. Length 122 μ: breadth 18 μ. Pudding Pond, North Conway, frequent!

Mesotaenium Näg.

M. macrococcum (Kütz.) Roy & Biss. (*M. Braunii*, Wolle '92). Reported from the Flume (*F. S. Collins*).

M. ENDLICHERIANUM Näg. Length 25 μ: breadth 8 μ. Intervale, frequent!

CYLINDROCYSTIS Menegh.

C. BREBISSONII Menegh. (*Penium Brebissonii*, Wolle '92). Var. MINOR W. & G. S. West. New to U. S. (Herbarium of Jos. A. Cushman, no. 112.) Length 28 μ: breadth 13 μ. Intervale, frequent!

C. CRASSA DeBary. (*Penium crassa*, Wolle '92.) Length 40 μ: breadth 20 μ. Mt. Moosilauke, abundant!

C. DIPLOSPORA Lund. (*Calocylindricus diplospora*, Wolle '92.) Length 48–61 μ: breadth 27–32 μ: isthmus 23–28 μ. Intervale, frequent!

*C. AMERICANUM W. & G. S. West. Var. **minor** var. nov. While specimens from Colorado agreed almost exactly with the types from New York, these specimens from New Hampshire and those from Newfoundland were considerably smaller and the variation seems to be constant. Length 34–40 μ: breadth 16–18 μ. Mt. Moosilauke! (H. C. no. 80.)

NETRIUM Näg.

N. DIGITUS (Ehrenb.) Itzigs. & Rothe. (*Penium Digitus* and *Penium lamellosum*, Wolle '92.) Length 200–280 μ: breadth 62–78 μ. Pudding Pond, North Conway! Intervale! Mt. Moosilauke, abundant! Saco Lake (*Wood*).

N. OBLONGUM (DeBary) Lütkem. (*Penium oblongum*, Wolle '92.) Length 96 μ: breadth 29 μ. Intervale!

* Var. CYLINDRICUM W. & G. S. West. New to U. S. (H. C. no. 78.) Length 60–71 μ: breadth 18–20 μ. Mt. Moosilauke, abundant!

* Forma **major** (Turner) forma nov. Length 168 μ: breadth 44 μ. Pudding Pond, North Conway, frequent!

N. INTERRUPTUM (Bréb.) Lütkem. (*Penium interruptum*, Wolle '92.) Length 172–320 μ: breadth 38–40 μ. Intervale, scarce!

PENIUM Bréb.

P. LIBELLULA (Focke) Nordst. (*P. closterioides*, Wolle '92.) Length 233–320 μ: breadth 38–50 μ. Intervale, scarce! Pudding Pond, North Conway, common! North Woodstock, common!

* Var. INTERRUPTUM W. & G. S. West. New to U. S. (H. C. no. 116.) Length 120 μ: breadth 22 μ. Pudding Pond, North Conway!

P. MARGARITACEUM (Ehrenb.) Bréb. Length 150 μ: breadth 22 μ. Intervale! Pudding Pond, North Conway! Plymouth (*Wests*). Their specimens did not show the linear arrangement of the markings.

P. POLYMORPHUM Perty. Length 50 μ: breadth 20 μ. Pudding Pond, North Conway, occasional!

P. MINUTUM (Ralfs) Cleve. (*Docidium minutum*, *Penium minutum*, *Calocylindus minutum*, Wolle '92.)

* VAR. ELONGATUM W. & G. S. West. Length 372 μ: breadth 9 μ. Variety new to United States. (H. C. no. 115.) Pudding Pond, North Conway!

ROYA W. & G. S. West.

R. OBTUSA (Bréb.) W. & G. S. West. (*Closterium obtusum*, Wolle '92.) Length 150 μ: breadth 15 μ. Pudding Pond, North Conway!

CLOSTERIUM Nitzsch.

* C. CYNTHIA DeNot. Length 140 μ: breadth 15.5 μ. North Woodstock!

C. DIDYMOTOCUM Corda. Length 400–403 μ: breadth 25–34 μ: apices 13 μ. Intervale, common! Mt. Moosilauke!

C. MACILENTUM Bréb. Length 527 μ: breadth 15.5 μ: apices 6 μ. Intervale!

* Forma INTERMEDIUM Racib. Form new to U. S. (H. C. no. 114.) Length 200 μ: breadth 8.5 μ: apices 5 μ. Pudding Pond, North Conway!

C. ANGUSTATUM Kütz. Var. CLAVATUM Hastings. Length 650 μ: breadth 28 μ: apices 16 μ. North Woodstock! Rochester (*Hastings*). Saco Pond (*Wood*). Hanover (*Edwards*).

C. COSTATUM Corda. Length 340–410 μ: breadth 38–44 μ. Pudding Pond, North Conway!

* Var. **Westii** var. nov. (*C. costatum*, forma: W. & G. S. West: Trans. Linn. Soc. Lond. (Bot.) v. 237. t. XIII, f. 23, 24). Length 230–300 μ: breadth 25–32 μ: apices 10–12 μ. Cells only slightly

curved, tumid in the middle, apices truncate: membrane punctate between the striae: smaller than the typical form of the species. North Woodstock! (H. C. no. 189.)

* C. REGULARE Bréb. Length 250 μ: breadth 37 μ: apices 8 μ. New to U. S. (H. C. no. 107.) Intervale!

C. STRIOLATUM Ehrenb. Length 332 μ: breadth 37 μ: apices 12.4 μ. Saco Pond (*Wood*). Meredith (*Wests*). Plymouth (*Wests*) (H. J. no. 382)!

VAR. INTERMEDIUM (Ralfs) Jacobs. Length 245 μ: breadth 34 μ. Intervale!

* VAR. ELONGATUM Rab. Length 400 μ: breadth, 25 μ. Intervale!

* VAR. ERECTUM Klebs. Length 360 μ: breadth 34 μ. (H. C. no. 187.) North Woodstock!

* **Closterium intervalicola** sp. nov. (PLATE 61, FIG. 1.) Length 168 μ: breadth 15.5 μ: apices 6 μ. Small Closterium with the median portion nearly straight, but with the ends decidedly curved: apices squarely truncated: about six visible striae: cell wall of a light yellowish color in empty cells. Intervale! (H. C. no. 104.)

C. JUNCIDUM Ralfs. Length 320–375 μ: breadth 6–8.5 μ: apices 3.5 μ. Pudding Pond, North Conway! Saco Lake (*Wood*).

C. DIANAE Ehrenb. Length 325 μ: breadth 25 μ. Pudding Pond, North Conway!

C. PARVULUM Näg. Length 108–170 μ: breadth 10–13 μ: apices 1.5–2.5 μ. Pudding Pond, North Conway!

* C. INCURVUM Bréb. Length 68 μ: breadth 12 μ. New to U. S. (H. C. no. 101.) Intervale!

C. VENUS Kütz. Length 72–75 μ: breadth 9–10 μ. Bog near Noone's Station! Mt. Moosilauke, common!

* C. CALOSPORUM Wittr. Length 108 μ: breadth 10 μ. Pudding Pond, North Conway!

C. ACUMINATUM Kütz. Length 325–360 μ: breadth 25–31 μ. Pudding Pond, North Conway!

C. MONILIFERUM (Bory.) Ehrenb. Length 265 μ: breadth 40 μ. Intervale!

C. EHRENBERGII Menegh. (*C. robustum* Hastings.) Length 400-480 μ: breadth 100–120 μ. Page Brook, Rochester (*Hastings*).

C. ACEROSUM (Schrank.) Ehrenb. Length 450 μ: breadth 38 μ. Intervale!

C. Lunula (Müll.) Nitzsch. Length 510–530 μ: breadth 71–90 μ. North Woodstock! Pudding Pond, North Conway, common!

* Forma minor W. & G. S. West. Length 403 μ: breadth 56 μ. Intervale!

C. Johnsonii W. & G. S. West. Length 357 μ: breadth 12 μ: apices 12 μ. Plymouth (H. J. no. 655)! On examining the type of this species its closeness to *C. didymotocum* was at once noticed. The sigmoid character of the specimen may be due to the mounting of it as but one semicell seems to give this character. The apices have the dark brown annular thickening characteristic of *C. didymotocum*. It is however somewhat more attenuated than the ordinary forms of that species.

C. tumidum Johnson. Length 130–150 μ: breadth 15–18 μ. Pudding Pond, North Conway! Holderness, frequent (*Johnson*).

C. attenuatum *Ehrenb.* Length 465 μ: breadth 45 μ. Pudding Pond, North Conway!

C. turgidum Ehrenb. * Forma **intermedium** forma nov. Length 400 μ: breadth 28 μ: apices 7–9 μ. Smaller by one half or one third than the typical form. Intervale! (H. C. no. 110).

C. Braunii Reinsch. (*C. maculatum* Hastings. *C. areolatum* Wood.) Breadth 25–30 μ. Rochester (Hastings).

C. pronum Bréb. Length 320–375 μ: breadth 6–8.5 μ. Pudding Pond, North Conway!

C. lineatum Ehrenb. var. costatum Wolle. Rochester (Wolle).

C. Ralfsii Bréb. var. hybridum Rab. Length 540–575 μ: breadth 40–63 μ: apices 10.5–11 μ. Pudding Pond, North Conway! Moore's Station!

C. decorum Bréb. Length 510–540 μ: breadth 25–48 μ: apices 6–9 μ. Pudding Pond, North Conway! North Woodstock!

C. Kuetzingii Bréb. Length 420–450 μ: breadth 22 μ: apices 3 μ. Pudding Pond, North Conway!

C. setaceum Ehrenb. Length 400–465 μ: breadth, 10 μ: apices 1–2 μ. Pudding Pond, North Conway!

Docidium (Bréb.) Lund.

* D. undulatum Bail. (*D. dilatatum*, Wolle '92.)

* Forma perundulatum W. & G. S. West (Plate 61, figs. 2, 3). Length 223–330 μ: breadth at base 12–12.5 μ: at apices 12.5–13 μ.

Intervale! Pudding Pond, North Conway! There are no plications at the apices in these specimens nor in the series which have been seen from Florida and Cuba. In looking up Bailey's original drawings, several of this species were found. But one of these had the plicated apices. This was evidently an unfortunate publication of this figure as the type figure, as it did not truly represent the species. Wolle's figure of *D. dilatum* represents a typical *D. undulatum*.

PLEUROTAENIUM Näg.

P. CORONATUM (Bréb.) Rab. (*Docidium coronatum*, Wolle '92.) Length 480–580 μ: breadth at base 56–63 μ: apices 34–40 μ. Pudding Pond, North Conway! Noone's Station!

* Var. FLUCTUATUM West. Length 900 μ: breadth at base 65 μ: at apex 46 μ. Variety new to U. S. (H. C. no. 105.) Intervale!

* **P. subgeorgicum** sp. nov. (PLATE 61, FIG. 4). *Pleurotaenium* of much the same type as *P. Georgicum* Lagerh. but one third smaller, a crown of ten bluntly rounded spines at the apex, four or five undulations at the basal portion, ends of the semi-cell much narrower than the middle. Length 651 μ; breadth at base 31 μ; at middle of semicell 50 μ; at apex 28 μ. North Woodstock! (H. C. no. 188.)

P. EHRENBERGII (Bréb.) DeBary.

* Var. ELONGATUM West. Var. new to U. S. (H. C. no. 113.) Length 573 μ: breadth 25 μ: apices 19 μ. Pudding Pond, North Conway! This seems to be close to *P. excelsum* (Turner).

* Var. UNDULATUM Schaarschm. Var. new to U. S. (H. C. no. 101.) Length 496 μ: breadth 22 μ: apices 15 μ. Pudding Pond, North Conway!

P. TRABECULA (Ehrenb.) Näg. Length 496 μ: breadth 25 μ: apices 25 μ. Noone's Station!

* Forma GRANULATA G. S. West. Length 505 μ: breadth 34 μ: apices 28 μ. Form new to U. S. (H. C. No. 76.) Mt. Moosilauke!

Var. RECTUM (Delp.) W. & G. S. West. (*Docidium rectum*, Wolle, '92.) Length 250 μ: breadth at base 19 μ: apices 15 μ. North Woodstock!

P. CONSTRICTUM (Bail.) Wood. (*Docidium constrictum*, Wolle, '92.) (PLATE 61, FIG. 5.) Length 560 μ: breadth at isthmus 23 μ: maxi-

mum breadth 44 μ: apices 32 μ. End with eight large bluntly pointed teeth, base with a suggestion of nodes. Pudding Pond, North Conway, frequent! Laconia, scarce (Wests).

P. VERRUCOSUM (Bail.) Lund. (*P. tessellatum* (Josh.) Lagerh., *P. trochiscum* W. & G. S. West.) Length, 420 μ: breadth at base 28 μ: at apex 22 μ. End with six or eight teeth. From a study of Bailey's original notes it seems safe to place both of the above species as synonyms of *P. verrucosum*. Pudding Pond, North Conway, frequent!

P. NODOSUM (Bail.) Lund. Length 290 μ: breadth at isthmus 27 μ: maximum breadth 50 μ: apices 34 μ. Intervale, abundant! Pudding Pond, North Conway! Noone's Station! Laconia, not common (Wests) (H. J. no. 480).

TRIPLOCERAS Bail.

T. GRACILE Bail. Length 490 μ: breadth at base 25 μ: at apex 24 μ. Pudding Pond, North Conway, frequent! Saco Lake (*Wood*). Laconia, common (Wests) (H. J. no. 649).

* Var. **montana** var. nov. (PLATE 61, FIG. 6.)

Variety with the apices with two simple processes, the base but six-radiate, whole form slender, apex considerably wider than the rest of the semi-cell. Length 360 μ: breadth at base 16 μ: apex 22 μ. Intervale! (H. C. no. 162.)

T. VERTICILLATUM Bail. (PLATE 61, FIG. 7.) Length 505 μ: breadth 40–47 μ: apices with processes 53 μ. Intervale! Pudding Pond, North Conway! Saco Lake (*Wood*). Laconia (*Wests*) (H. J. no. 649)! This was in all cases seen the form with two bidentate processes at the end.

Var. TURGIDUM Wolle. Rochester (*Wolle*).

TETMEMORUS Ralfs.

T. BREBISSONII (Menegh.) Ralfs. Length 189 μ: breadth 34 μ. North Woodstock!

T. GRANULATUS (Bréb.) Ralfs. Length 178–236 μ: breadth 36–42 μ: isthmus 29 μ. North Woodstock! Intervale! Pudding Pond, North Conway! Noone's Station!

EXPLANATION OF PLATE 61.

Figure 3, × 660; all others, × 460.

Figure 1. *Closterium Intervalicola* sp. nov.
" 2, 3. *Docidium undulatum* Bail., forma *perundulatum* W. & G. S. West.
" 4. *Pleurotaenium subgeorgicum* sp. nov.
" 5. *Pleurotaenium constrictum* (Bail.) Wood.
" 6. *Troploceras gracile* Bail., var. *montana* var. nov.
" 7. *Pleurotaenium verticillatum* Bail.

(*To be continued.*)

SCROPHULARIA LEPORELLA AT WILLOUGHBY. — While visiting the Willoughby region last August the writer made an exploring trip on the West side of the lake in company with Mr. A. B. Emerson of Barton. We first examined an unreported sphagnum swamp near the lake, known as "Beaver Meadow." Numerous Heaths and Orchids were growing here in considerable quantity, some of which are marked uncommon in the listed flora of the region. This meadow deserves a more careful investigation by botanists. Emerging from the swamp in the direction of the Barton road, and crossing an upland pasture, we came upon a colony of *Scrophularia leporella*, Bickn. The plants were growing vigorously in springy soil and close beside a large boulder. Though late in August several of the thyrses were in full bloom. The writer recognized the genus and giving a specimen to Judge Churchill, he pronounced it *S. leporella*, Bickn. The plant is not in Dr. Kennedy's list of the Willoughby Flora, nor does it seem to have been previously reported from this part of the state. — Geo. H. Tilton, Woburn, Massachusetts.

ILLUSTRATIONS AND STUDIES OF THE FAMILY ORCHIDACEAE,[1] by Oakes Ames, A. M. — Mr. Ames's volume on the orchids is a notable contribution to the knowledge of this vast and difficult group of plants. The work not only shows great care in investigation, but in all details of presentation it is a model of clearness and accuracy. The present volume, which we are glad to learn is the forerunner of a series, deals with subject matter which may be grouped under four heads. In the first part about a score of tropical species, belonging to the genera *Acoridium*, *Cestichis*, *Campylocentrum*, *Ionopsis*, *Coral-*

[1] Fascicle 1; imperial 8vo., 156 pp., 16 pl. Houghton, Mifflin & Co., 8 Apr. 1905.